

CLAIMS

What is claimed is:

1. A host interface adaptive hub, comprising:
- 5 a first loop;
- a second loop;
- a first host server interface terminal coupled to the first loop;
- a second host server interface terminal coupled to the second loop;
- a loop healing switch coupled to the first loop and the second loop, wherein upon
- 10 detection of a failure the loop healing switch couples the first loop and the second loop.
2. The host interface adaptive hub of claim 1 wherein the adaptive hub is a fibre channel adaptive hub further comprising:
- a first storage controller terminal; and
- 15 a second storage controller terminal.
3. The host interface adaptive fibre channel hub of claim 2 further comprising:
- a first loop resiliency circuit coupled between the first loop and the first storage controller terminal; and
- 20 a second loop resiliency circuit coupled between the second loop and the second storage controller terminal.
4. The host interface adaptive fibre channel hub of claim 3 wherein the loop resiliency circuits comprise:
- 25 a port bypass circuit; and
- a signal detection unit, wherein when the signal detection unit detects a failure of a controller coupled to the signal detection unit, the signal detection unit disconnects

the controller from a loop coupled to the loop resiliency circuit.

5. The host interface adaptive fibre channel hub of claim 2 further comprising a first logic module to check for the presence of a loop port enable signal from a controller
5 coupled to the host interface adaptive fibre channel hub, and wherein when the loop port enable signal indicates there is a fault in the controller, the first logic module outputs a signal to cause the loop healing switch to couple the first loop and the second loop.

10 6. The host interface adaptive hub of claim 1 further comprising:
a third loop resiliency circuit coupled between the first loop and the first host server interface terminal; and
a fourth loop resiliency circuit coupled between the second loop and the host server interface terminal, wherein when one of the third and fourth loop resiliency
15 circuits detects a failure in a corresponding host server, the loop resiliency circuit disconnects the corresponding host server from the loop.

7. The host interface adaptive hub of claim 1 wherein the host interface adaptive hub is a copper fibre channel hub.

20 8. The host interface adaptive hub of claim 1 wherein a bandwidth of the host interface adaptive hub with the first and second loops disconnected is approximately twice the bandwidth of the host interface adaptive hub with the first and second loops coupled together.

25 ~~9.~~ A storage subsystem, comprising:
a first storage controller;
a second storage controller; and
a host interface adaptive fibre channel hub comprising:
30 a first loop coupled to the first storage controller;

a second loop coupled to the second storage controller;
a first host server interface terminal coupled to the first loop;
a second host server interface terminal coupled to the second loop; and
a loop healing switch coupled to the first loop and the second loop,
5 wherein upon detection of a failure the loop healing switch couples the first loop
and the second loop.

10 10. The storage subsystem of claim 9, further comprising a disk drive array,
and wherein the first and second storage controllers further comprise RAID storage
10 controllers.

11. The storage subsystem of claim 9 wherein the adaptive fibre channel hub
further comprises:
a first storage controller terminal; and
15 a second storage controller terminal.

12. The storage subsystem of claim 11 wherein the host interface adaptive fibre
channel hub further comprises:
a first loop resiliency circuit coupled between the first loop and the first storage
20 controller terminal; and
a second loop resiliency circuit coupled between the second loop and the
second storage controller terminal.

13. The storage subsystem of claim 12 wherein the loop resiliency circuits
25 comprise:
a port bypass circuit; and
a signal detection unit, wherein when the signal detection unit detects a failure of
a controller coupled to the signal detection unit, the signal detection unit disconnects
the controller from a loop coupled to the loop resiliency circuit.

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14. The storage subsystem of claim 11 wherein the host interface adaptive fibre channel hub further comprises a first logic module to check for the presence of a loop port enable signal from a controller coupled to the host interface adaptive fibre channel hub, and wherein when the loop port enable signal indicates there is a fault in the
5 controller, the first logic module outputs a signal to cause the loop healing switch to couple the first loop and the second loop.

15. The storage subsystem of claim 9 wherein the host interface adaptive hub further comprises:
10 a third loop resiliency circuit coupled between the first loop and the first host server interface terminal; and
a fourth loop resiliency circuit coupled between the second loop and the host server interface terminal, wherein when one of the third and fourth loop resiliency circuits detects a failure in a corresponding host server, the loop resiliency circuit
15 disconnects the corresponding host server from the loop.

16. The storage subsystem of claim 9 wherein the host interface adaptive hub is a copper fibre channel hub.

20 17. The storage subsystem of claim 9 wherein a bandwidth of the host interface adaptive hub with the first and second loops disconnected is approximately twice the bandwidth of the host interface adaptive hub with the first and second loops coupled together.

25 ~~18.~~ A host interface adaptive hub, comprising:
a first loop;
a second loop;
a first host server interface terminal coupled to the first loop;
a second host server interface terminal coupled to the second loop; and
30 a means for coupling the first loop and the second loop upon detection of a

failure.

19. A method for providing a host interface adaptive hub, comprising:
evaluating signals from a first controller coupled to a first loop to check for a
5 failure;
evaluating signals from a second controller coupled to a second loop to check for
a failure; and
upon detection of a failure affecting one of the first controller and the second
controller, coupling the first loop to the second loop so as to provide a plurality of host
10 servers access to a surviving controller.

20. The method for providing a host interface adaptive hub of claim 19 further
comprising:
checking for a storage controller failure; and
15 when a storage controller failure is detected, disconnecting the failed controller
from the corresponding loop.

21. The method for providing a host interface adaptive hub of claim 19 wherein
the host interface adaptive hub further comprises:
20 checking for a host server failure; and
when a host server failure is detected, disconnecting the failed host server from
the corresponding loop.

22. The method for providing a host interface adaptive hub of claim 19 wherein
25 a bandwidth of the host interface adaptive hub with the first and second loops
disconnected is approximately twice the bandwidth of the host interface adaptive hub
with the first and second loops coupled together.

23. The method for providing a host interface adaptive hub of claim 19 wherein
30 the host interface adaptive hub is a copper fibre channel adaptive hub.